

NNMC
Master Plan
Update 2008
Bethesda Campus

Figure 4-23

**Existing Loading Docks
& Delivery Routes**

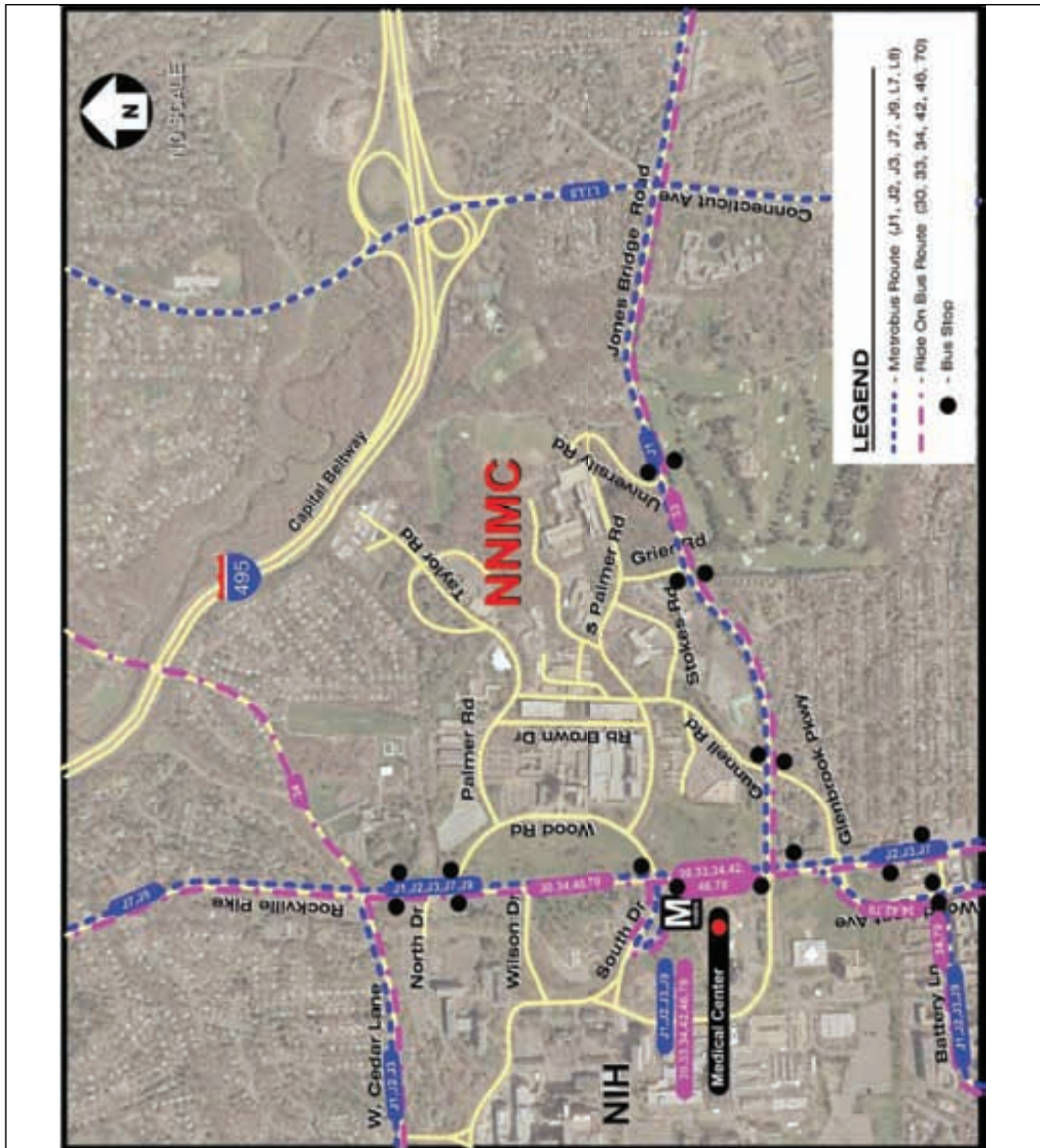
is located at the Medical Center Metrorail Station on the Red Line of the Washington Metropolitan Area Transit Authority (WMATA). The station is also a major stop / transfer point for several WMATA and Montgomery Ride-On bus routes. This station opens at 5:00 am on weekdays and at 7:00 am on weekends; and closes at 12:30 am from Sunday through Thursday, and at 3:30 am on Friday and Saturday. The trains operate with headways of 3 to 6 minutes during the peak weekday morning and afternoon periods, and with headways of 6 to 15 minutes during the weekday off-peak periods. The average number of weekday entries at this station is 5,255. On average there are 425 entries and 1,040 exits in the AM peak hour and 920 entries and 270 exits during the PM peak hour respectively.

The Metrobus routes serving the campus are as follows:

- Route J1 provides rush hour only service between the Silver Spring and Medical Center Metrorail stations via Jones Bridge Road with 30 minute headways.
- Routes J2 and J3 offer through service between the Silver Spring Metrorail Station and Montgomery Mall with intermediate stops in the Bethesda CBD and at the Medical Center Metrorail Station. These routes operate with 7-minute headways during peak hours, and 20-minute headways during off-peak hours.
- Westbound Routes J1, J2, J3 have 453 boardings and 322 alightings each weekday at Medical Center Metrorail Station; eastbound there are 285 boardings and 381 alightings.
- Routes J7 and J9 are the two new lines that comprise the “I-270 Express”. They run between the Lake Forest Transit Center Station and the Bethesda Metro Station.
- Westbound Routes J7, J9 have 8 boardings and 141 alightings each weekday at Medical Center Metrorail Station; eastbound there are 134 boardings and 13 alightings.

There are six (6) Ride-On Routes serving the Medical Center Metrorail Station. These are as follows:

- Route 30 is a local collector route that circles through the neighborhoods before terminating at the Bethesda Metro Station. There are 140 northbound alightings and 106 southbound boardings each weekday at Medical Center Metrorail Station.
- Route 33 and 34 provide rush hour only service to Wheaton Plaza from several areas. Route 33 northbound has 39 alightings and 46 boardings; Route 33 Southbound has 64 alightings and 9 boardings each weekday at Medical Center Metrorail Station. Route 34 northbound has 239 alightings and 39 boardings; southbound it has 241 alightings and 27 boardings each weekday at Medical Center Metrorail Station.



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Figure 4-24

**Existing
Transit Facilities**

- Route 42 provides service to Friendship Heights via Woodmont and Rockville Pike. There are 135 northbound alightings and 152 southbound boardings each weekday at Medical Center Metrorail Station.
- Route 46 connects NNMC with Rockville via Rockville Pike, with 20-minute headways and primarily serves as a feeder to the Metrorail Stations along this route. There are 317 northbound boardings and 302 southbound alightings each weekday at Medical Center Metrorail Station.
- Route 70 is an express service running between the Germantown Milestone park-and-ride lot and Bethesda. There are 202 northbound boardings and 9 alightings and 177 southbound alightings each weekday at Medical Center Metrorail Station.

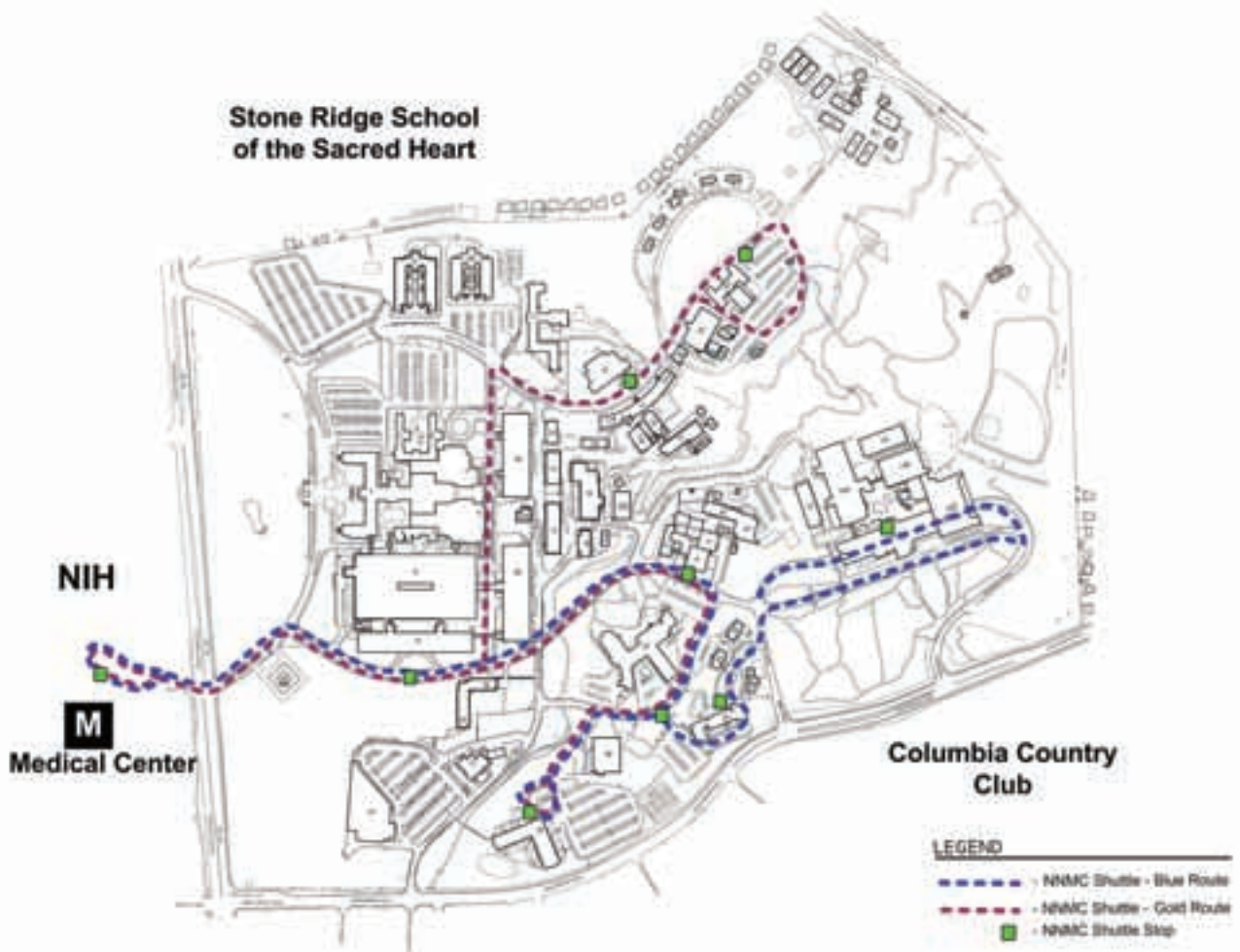
The total daily boardings and alightings at Medical Center Metrorail Station for these Ride-On bus routes are 1,098 and 1,131, respectively.

Heavy rail commuter service is available via the Maryland Rail Commuter (MARC) "Brunswick" line. Trains originate from Martinsburg in West Virginia, or Brunswick and Frederick in Maryland, and travel to Union Station in Washington, D.C. in the AM hours with reverse movements occurring in the evening. MARC currently operates nine (9) trains inbound to Washington in the morning and ten (10) trains outbound in the evening. All trains stop in Rockville about six miles to the north of the NNMC Bethesda campus, where a connection can be made to the Metro Red Line.

The NNMC provides Metrocheks to its military and civilian employees under The USDOT Mass Transportation Fringe Benefit (MTFB) Program. Metrocheks with a maximum value of \$115 per month are provided to each employee registered for the program. Approximately 1,187 NNMC employees and 1,500 Walter Reed employees collected Metrocheks during the first quarter of this year (2008). The Metrocheks can be used towards expenses incurred in any mass transit to and from work such as the Metrorail, Metrobus, MARC Train and registered van pools. However, an MTFB program member is not permitted to park any car in the NNMC campus and is instructed to remove any previously held parking sticker from the vehicle.

4.6.4 NNMC Shuttle Services

NNMC operates two shuttle bus lines. (Figure 4-25 Existing Shuttle Routes) The primary function of these services is to transport patients and visitors between the campus and the Medical Center Metrorail Station. The services were started due to more than half of the campus being beyond the 2,000 feet walking distance from the current Metrorail Station entrance / exit which is National Capital Planning Commission (NCPD) criteria for acceptable walking distance.



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Figure 4-25

**Existing Shuttle
Routes**

The Blue Line shuttle begins at the Medical Center Metrorail Station and runs primarily along South Palmer Drive, branches out on Stokes Road, loops around the Child Development Center (Day Care) and returns back to South Palmer Drive and continues down to loop around the USUHS underground garage. In April 2008 the ridership was 108 passengers per day.

The Gold Line shuttle also begins at the Medical Center Metrorail Station and runs along South Palmer Drive, branches out at Brown Drive, joins onto Taylor Road, continues towards the Research Institute to loop around the Navy Call Center and Health Services Building, before retracing its path back to South Palmer Drive, from where it branches out to Stokes Road and loops around the Child Development Center before returning back to the starting point. In April 2008 the ridership was 79 passengers per day. The NNMC Shuttle bus routes are shown in Figure 4-25.

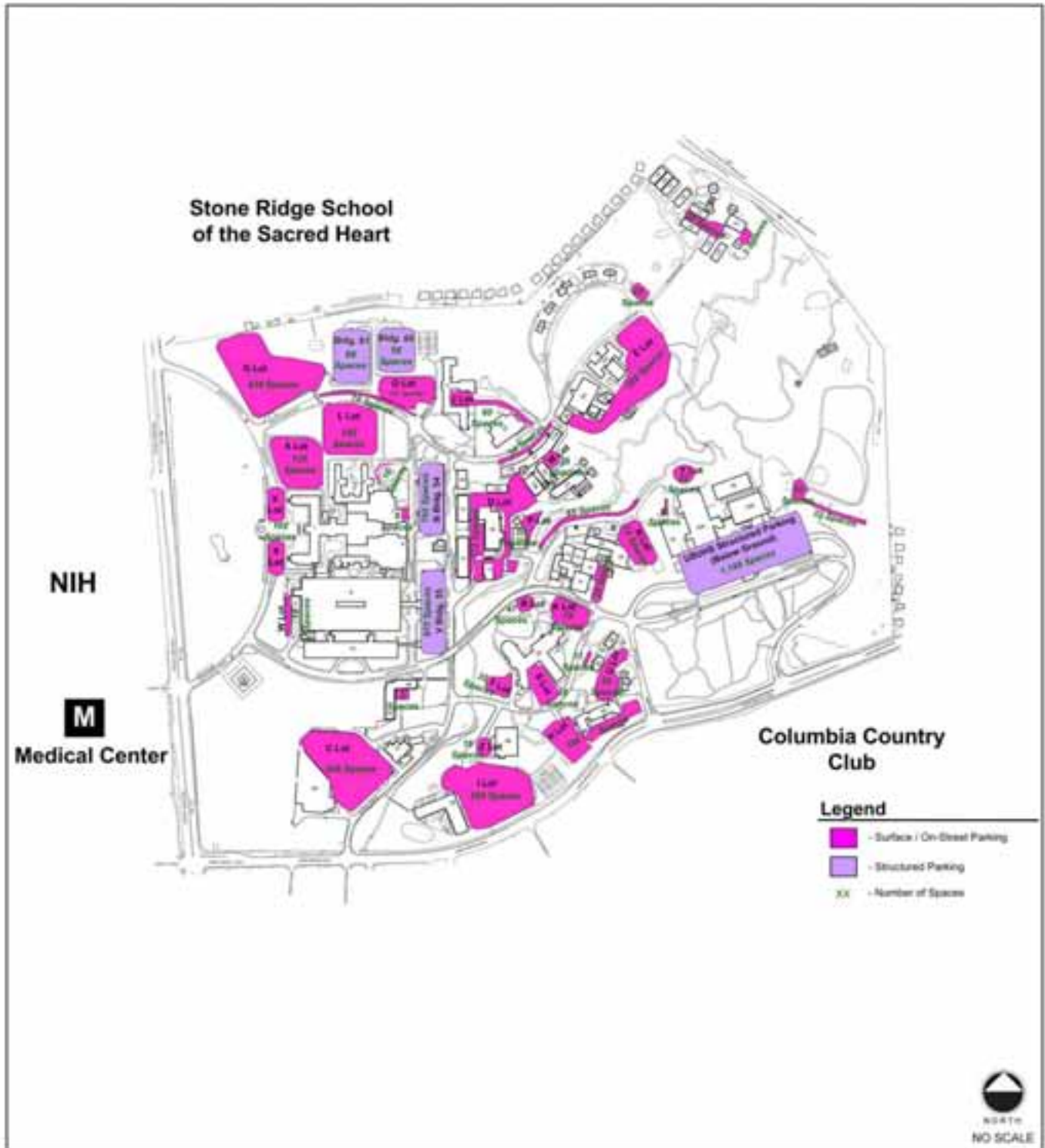
The NNMC is also accessed by shuttle bus services operated by other Department of Defense (DOD) agencies. These include the Walter Reed Army Medical Center, Annapolis Naval Station, Patuxent River and Naval Air Station and Quantico Marine Corps Base. These shuttle bus services are intended for designated official use to support the mission.

4.6.5 Existing Parking on Campus

Parking inventory and occupancy surveys were conducted during the late September-October (2006) to assess the existing campus parking situation. The surveys indicated that the total parking supply consisted of 6,058 parking spaces. Based on information provided by NNMC staff, the current parking supply is 6,058 spaces. (Figure 4-26 Existing Parking) The reduction is due to the demolition of Building 12 parking, re-striping of some spaces to accommodate more handicap parking, and other construction related activities. The existing parking is distributed among several surface lots, garages and on-street areas. The locations of the campus parking facilities are shown in Figure 4-26. A breakdown of the parking by facility type and major user category is presented in Tables 4.6.5a & b, respectively.

Table 4.6.5a Parking Space Distribution by Facility Type

| | |
|---------------------|---------------------|
| Structured Parking | 3,087 (51%) |
| Surface Parking Lot | 2,735 (45%) |
| On-Street Parking | 236 4%) |
| TOTAL | 6,058 (100%) |



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Figure 4-26

Existing Parking

Table 4.6.5b Parking Space Distribution by User Category

| Parking User Category | Supply | Utilization ⁵ |
|-----------------------------------|-------------------|--------------------------|
| Staff | 4056 ¹ | 3609 |
| Lodging (Temporary and Permanent) | 685 ² | 212 |
| Patient/Visitor/Resident | 961 ³ | 770 |
| NEX/MWR Visitor | 291 ⁴ | 217 |
| Government Vehicles | 65 ⁵ | 0 |
| TOTAL | 6058 | 4808 |

(Source: G/S A Field Survey)

Notes:

1. The Staff Parking areas include: Complete Lots A, E, J, K, L, M, N, P, R, W, X, Y, NX, Partial Lots D, G, H, I, S, T, on-street along N. Palmer Road, on-street front of Bldg.17, on-street along Stone Lake Road (west), Bldg 241, Bldg 242, USUHS Garage, Gravel Lot behind USUHS (Stone Lake Road east), adjacent surface parking (ball field), Circle 7 north of Bldg. 7 and Bldg. 74. Staff category includes medical staff, warehouse staff, contractors, major tenants like USUHS and AFFRI, other administration staff, childcare staff, volunteers and other reserved spaces for Senior NCO's and Officers.
2. The Permanent Lodging parking areas include: Partial Lots C, G, H, Complete Lot Q, Bldg. 50, Bldg. 60, Bldg. 61, Parking areas for Temporary Lodging are Lot H (Partial), Lot U (Complete) front of Bldg. 24, and 25. The permanent lodging includes three existing BEQs, while the temporary lodging includes the Navy Lodge and the Fisher Houses.
3. The NNMC Patient/Visitor areas include: Bldg. 55 Garage (majority), open spaces of all staff lots except Lot H are also shared with visitors . This category includes medical In/Out patients, visitors and Resident Doctors.
4. The NEX/MWR visitor parking is Lot C (majority), Partial Lots S , T, I and Z (complete). Apart from the NEX store, this category includes the Quick Mart/NEX Gas Station and McDonalds, bowling alley, and package store.
5. Government Vehicles: Partial Lots C, D, H, I, Partial Bldg 55 Garage, Taylor and Van Rypen laydown area east of flag housing and Bldg 7. This category includes all motor pool, police and security vehicles, ambulances, shuttle buses and buses.
6. The occupancy was based on parking occupancy spot survey conducted by G/SA.

Table 4.6.5b also shows the parking occupancy results, by major user categories. The data indicates a peak parking demand of approximately 80 percent (4,808 + spaces) for the entire campus. The data also indicates that the existing employee- parking supply ratio is 0.507 spaces per employee. This was computed by combining the parking spaces for the NNMC staff and USUHS categories, and relating the computed total to the total employee population (8,000).

4.6.6 Existing Pedestrian and Bicycle Facilities

An assessment of the pedestrian and bicyclist facilities and services along the study area roadways providing direct access to campus was undertaken. The inventory and evaluation found most of the facilities to be in good condition, function efficiently, provide for a high level of user safety and to be in compliance with the standards of the County and the American Association of State Highway and Transportation Officials (AASHTO).

The main NNMC pedestrian/bicyclist access and circulation occurs along Rockville Pike between Cedar Lane and Jones Bridge Road and Jones Bridge Road between Rockville Pike and Connecticut Avenue. The highest pedestrian and bicyclist activities occur at the Medical Center Metrorail Station. Table 4.6.6 below presents a detailed inventory of existing sidewalk, crosswalk and pedestrian related signage conditions along these sections. Notable deficiencies along MD 355 and Jones Bridge Road, in the vicinity of NNMC, are narrow sidewalks without adequate buffer separation from adjacent traffic, utility poles obstructing pedestrian movements, lack of “zebra” striping at some major intersections, poorly marked crosswalks and lack of crosswalks at side streets and NNMC entrances. The pedestrian related signage is in good condition and well placed along all these routes.

Table 4.6.6 Inventory of Existing Pedestrian Facilities

| Roadway Segment | Sidewalk | | | | | Crosswalk Markings | Pedestrian-Related Signage Condition |
|--|--|---------------------------------------|--|---|---|--|--------------------------------------|
| | Width | General Condition | Buffer | ADA Compliant | ADA Compliant Intersection Curb Ramps | | |
| Rockville Pike (between Jones Bridge Road and Cedar Lane) | Fair (8' west side; 3' – 5' east side) | Fair (good west side; poor east side) | Good west side; poor east side | Fair (effective sidewalk width mostly under 5' with utility poles obstructing pedestrian ROW on east side; grade issues on west side) | Fair (curb-ramps face crossings on west side; ramps on east side face center and are poorly maintained) | Fair (mostly “zebra” striped along west side; poorly marked crosswalk on east side of Jones Bridge at Wisconsin Ave; lack of “zebra” striping on Cedar Lane at Rockville Pike; NNMC entrances lack crosswalk striping) | Good |
| Jones Bridge Road (between Connecticut Avenue and Wisconsin Avenue) | Fair (4' – 6') | Good | Fair (no buffer between Connecticut Ave and Montrose Drwy) | Fair | Good | Fair (crosswalks at Connecticut Ave and Jones Bridge Road lack “zebra” striping; side streets lack marked crosswalks) | Good |

Source: G/SA Field Survey

* Both FHWA and the Institute of Transportation Engineers (ITE) recommend a minimum width of 5 feet for a sidewalk or walkway, which allows two people to pass comfortably or to walk side by side.

** According to FHWA, a buffer zone of 4 to 6 feet is desirable and should be provided to separate pedestrians from street.

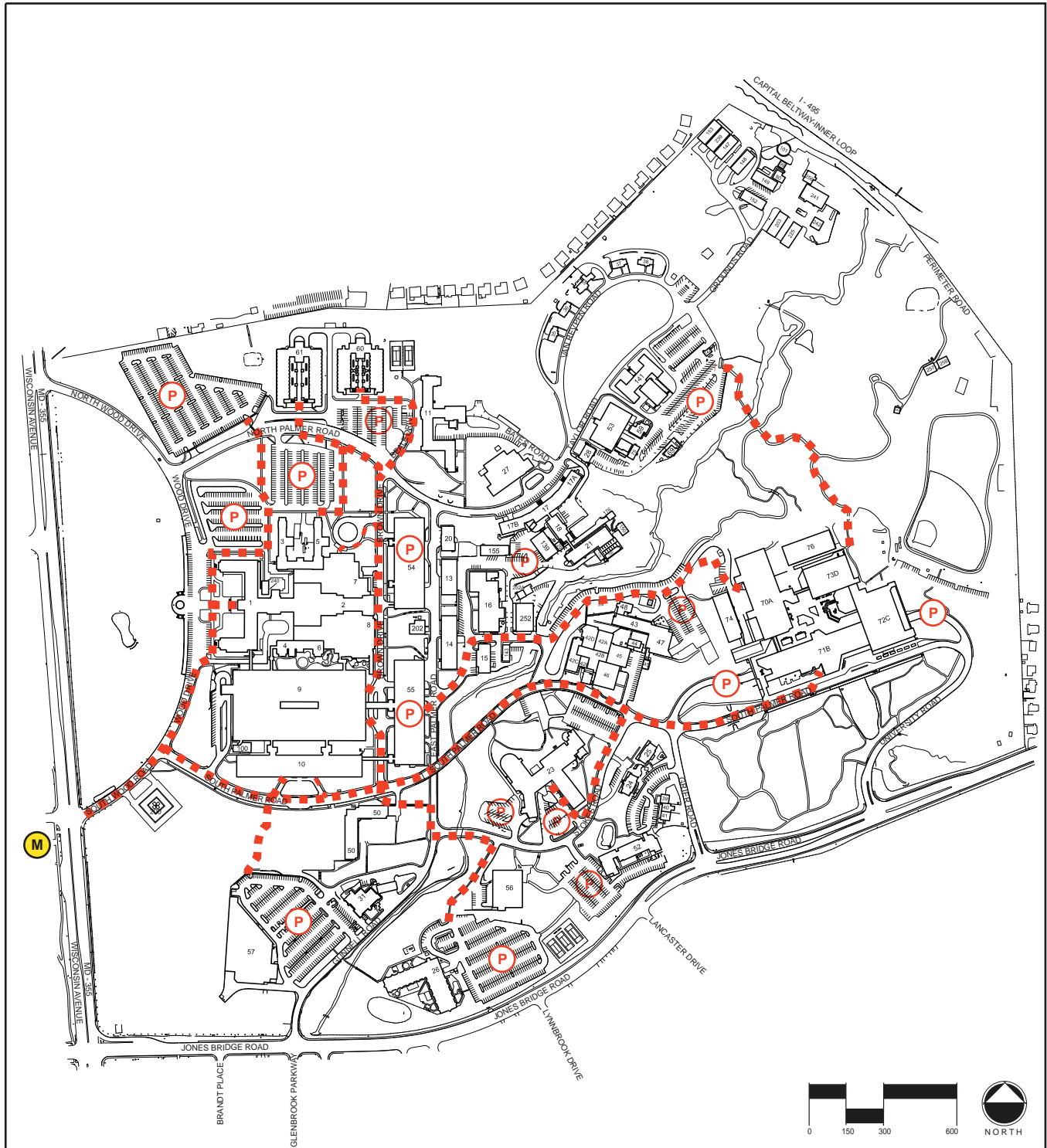
The campus land uses are connected by a network consisting of sidewalks, crosswalks and other pedestrian amenities. There are no exclusive bicycle travel facilities on the campus. (Figure 4-27 Existing Pedestrian Paths) shows the location of the pedestrian facilities within and outside the campus. This figure also shows the major pedestrian-vehicular conflict points.

The primary pedestrian flow occurs among three land use categories within the campus, namely the transit center, the parking lots and campus building facilities. The building facilities can be divided into five broad categories, namely the Hospital, Research, USUHS, Comfort Zone and Residential (Figure 4-28 Pedestrian Figures). Secondary pedestrian flow occurs

between two interactive facility land uses like the Hospital facilities and the Comfort Zone (which includes employee amenities like Gym / Day Care and Dining Facilities) or between Research and Hospital facilities. (Figure 4-29 Existing Major Pedestrian Desire Paths) shows the major pedestrian desire lines with respect to the land uses.

There are five entrances to NNMC, two from Rockville Pike and three from Jones Bridge.

- The North Gate is configured with three lanes. Two lanes serve inbound traffic while one lane serves outbound traffic. The entrance is closed from 7:00 pm to 5:00 am from Monday to Friday, and on weekends and holidays. In the very near future, electronic signal devices will be installed to allow view from MD 355 as to the green “Down Arrow” travel lanes and the red “X” no travel lanes.
- The South Gate is located at the Wood Road South intersection along Rockville Pike. It is the main entrance to the campus, and is located across Rockville Pike from the NIH South Drive entrance and the WMATA Medical Center Metrorail Station. This gate is open all the time, except when there is activity related to the use of the adjacent heliport facility. The entrance consists of one lane inbound and two lanes outbound. The South Gate is also the main access point for pedestrian traffic, most of which is generated by the Medical Center Metrorail Station. The South Gate serves as the Commercial Vehicle inspection gate when the Navy Lodge/Grier Road gate is closed to inbound traffic or closed altogether.
- The Navy Exchange Gate is located at the Gunnell Road intersection along Jones Bridge Road. It is open to two-way traffic, with one travel lane provided in each direction, from 5:00 am to 7:00 pm from Monday to Friday. The gate is closed at all other times including weekends and holidays.
- Navy Lodge Gate is located at the Grier Road intersection along Jones Bridge Road. All commercial vehicles are inspected at this gate. Grier Road is divided, and provides a single inbound lane and two outbound lanes. The gate serves only truck traffic in the inbound direction from 5:00 am to 6:00 pm. Outbound passenger vehicle traffic is served only between 3:00 pm - 6:00 pm from Monday to Friday. The gate is closed at all other times.
- USUHS Gate is located at the University Road intersection along Jones Bridge Road. The USUHS Gate is open to one lane inbound traffic between 5:00 am to 8:30 am from Monday to Friday, and is closed during other times.

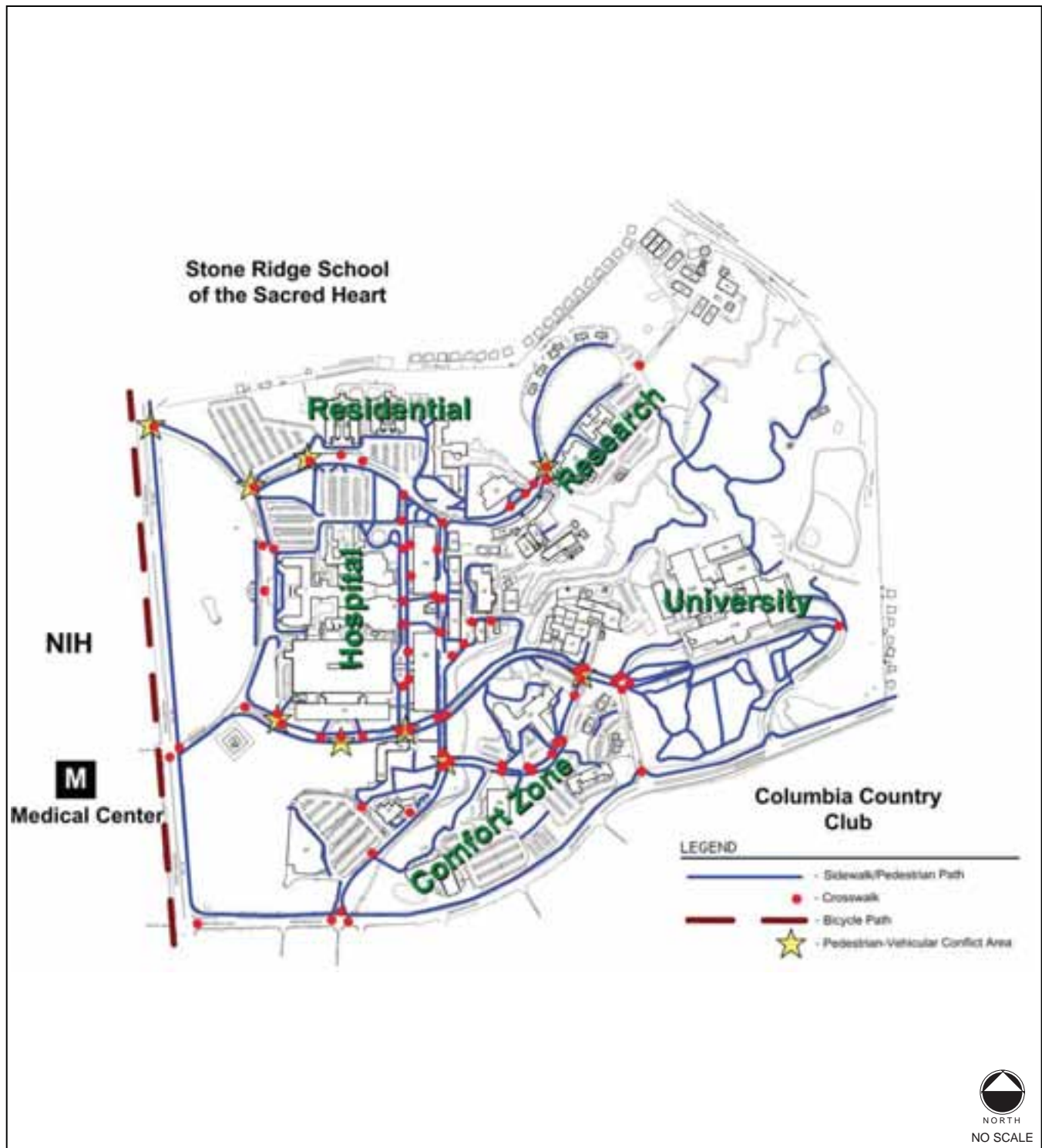


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- M METRO STATION
- P VEHICULAR PARKING
- PEDESTRIAN PATH

Figure 4-27

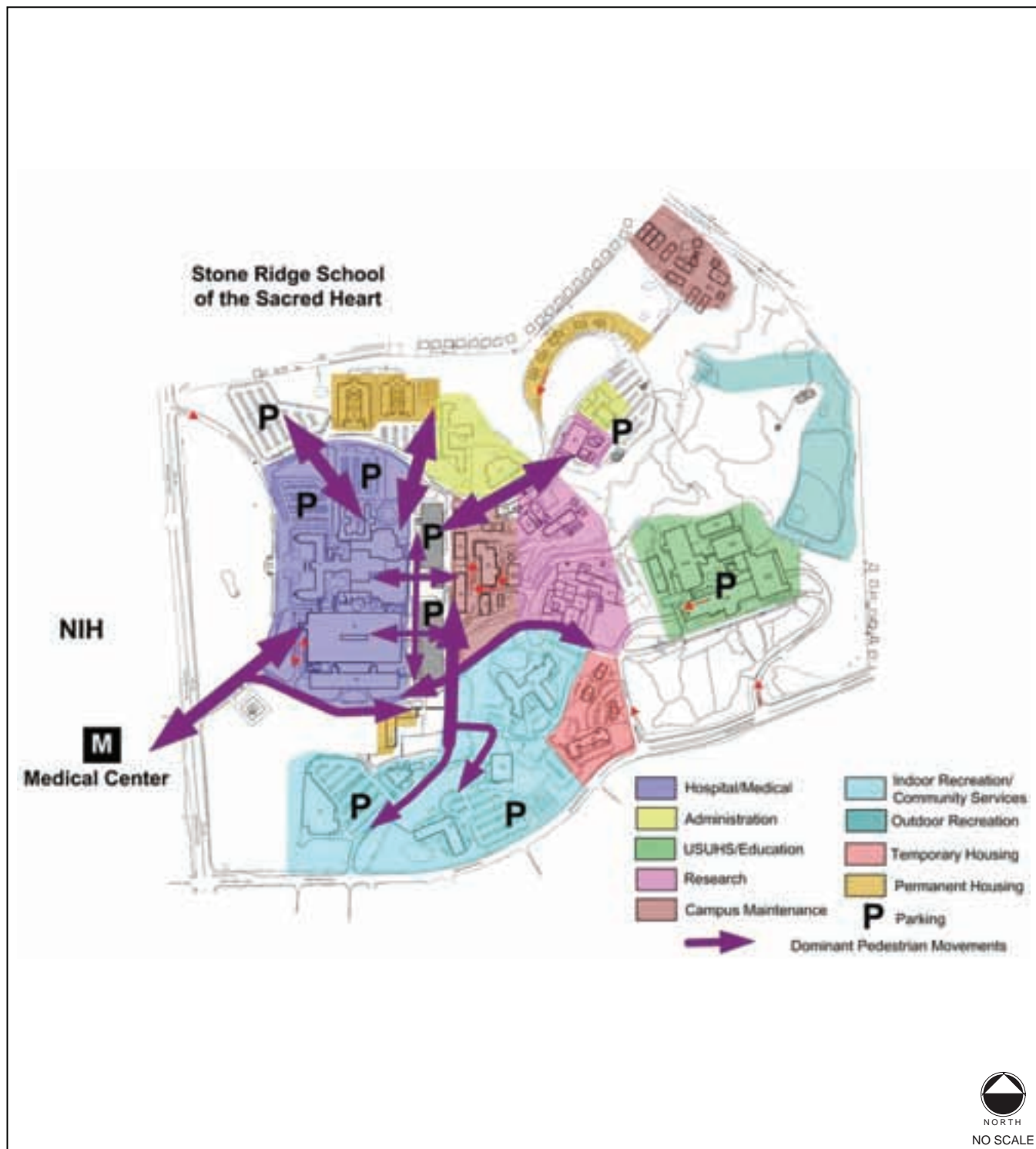
**Existing
Pedestrian Paths**



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Figure 4-28

Pedestrian Figures



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Figure 4-29

**Existing Major
Pedestrian Desire Paths**

4.7 Site Amenities

4.7.1 Natural Amenities

Prior to any construction on the existing campus, the land was a farm with rolling hills and some heavily wooded areas along Stoney Creek. Similar topography and natural beauty still exists on campus and is an asset that contributes to the campus environment.

4.7.2 Character

There exists a number of Architectural vocabularies throughout campus that contribute to the character of their respective locations (Figure 4-30 Existing Architectural Character). Not all buildings identified are occupied and some small buildings are not categorized. The building 40 series is a mix of multiple styles built in the 1960's - 1980's but are interconnected so they do not fall within a single category. Buildings on campus are identifiable with one of the following styles.

Art Deco – the tower and the original structures designed by and constructed under the supervision of architect Paul Cret are Art Deco in style and important to the history of NNMCC. At the time of its design and construction this architectural vocabulary was the prevailing vernacular of the avant garde. Cubic forms streamlined with smooth wall surfaces and disciplines detailing characterized similar art deco structures such as the Empire State Building and the Chrysler Building. Buildings 1, 2, 4, 6, 14, and 17 were in this first group of original buildings built between 1939 and 1941, however, the front buildings are certainly more elaborate in their detailing. Cret also designed and oversaw a second phase of construction were completed in 1942 and 1943. The buildings in this second phase that are Art Deco in design include 3, 5, 17A, 17B. To a lesser degree, future additions to the medical complex, buildings 7 and 8 retained some of the vertical elements and smooth wall surfaces of the Art Deco style, and are included in this group.

Concrete Block / Utilitarian – this group of concrete or block exterior structures are simple and utilitarian in their design. This category includes older buildings such as Building 11, 13, 15, 16, 18, 20 and 139. While they were also all designed by Cret and retained some of the Art Deco characteristics, the original dormitories (Buildings 11) and supporting buildings (13, 15, 16, 18, and 20) were much more utilitarian in nature. Still, these structures contribute to the history of NNMCC. Also included in this category are buildings 21, 28, 53, 74, 141, and 143.

Brick / Traditional – these brick buildings can be associated with a traditional or classical style. Although they are relatively recent construction, the Fisher houses, Buildings 24 and 25, can be attributed to a Georgian or Revival style in character. Also residential in nature, the original Flag houses, buildings 34, 35, 36, 37 and 38, also designed by Cret, feature classical elements.



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- A** ART DECO
- B** CONCRETE - UTIL
- C** BRICK
- D** STONE / WOOD
- E** STONE / CONCRETE

- F** METAL / BLOCK - UTIL

Figure 4-30

**Existing
Architectural Character**

Brick / Modern – these buildings on campus are predominately brick but many use cast stone accents to relate to the finish of the original Cret structures. Others incorporate unique window elements, rooflines or finishes. This category includes Building 26, 31, 52, 56, 57, 60, 61, 70, 71, 72 and 73.

Brick / Utilitarian – these buildings also are generally of brick, but are more utilitarian in their design and include the resident buildings 39, 40, and 41, barracks building 50, as well as building 59.

Stone / Wood – Building 23, also designed by Cret is of a completely different style than his other designs and incorporated natural stone and wood in the design of the Officer's Club and Recreation Building. Recreation buildings and pavilions are also listed in this category, but are of a much smaller scale and include buildings 257 and 258.

Stone / Concrete / Modern – more recently constructed buildings are light in color, and of modern design. Materials generally include cast stone, structural concrete, tilt up construction and modern applications of glazing. This category includes buildings 27, 9, 10, and the parking garages buildings 54 and 55.

Metal / Prefab – these facilities are basic utility structures and do not have a positive identifiable character. This category includes buildings 69, 79, 147, 148, 149, 152, 153, 154, 155, 203, 225, 239, and 241.

4.7.3 Recreation

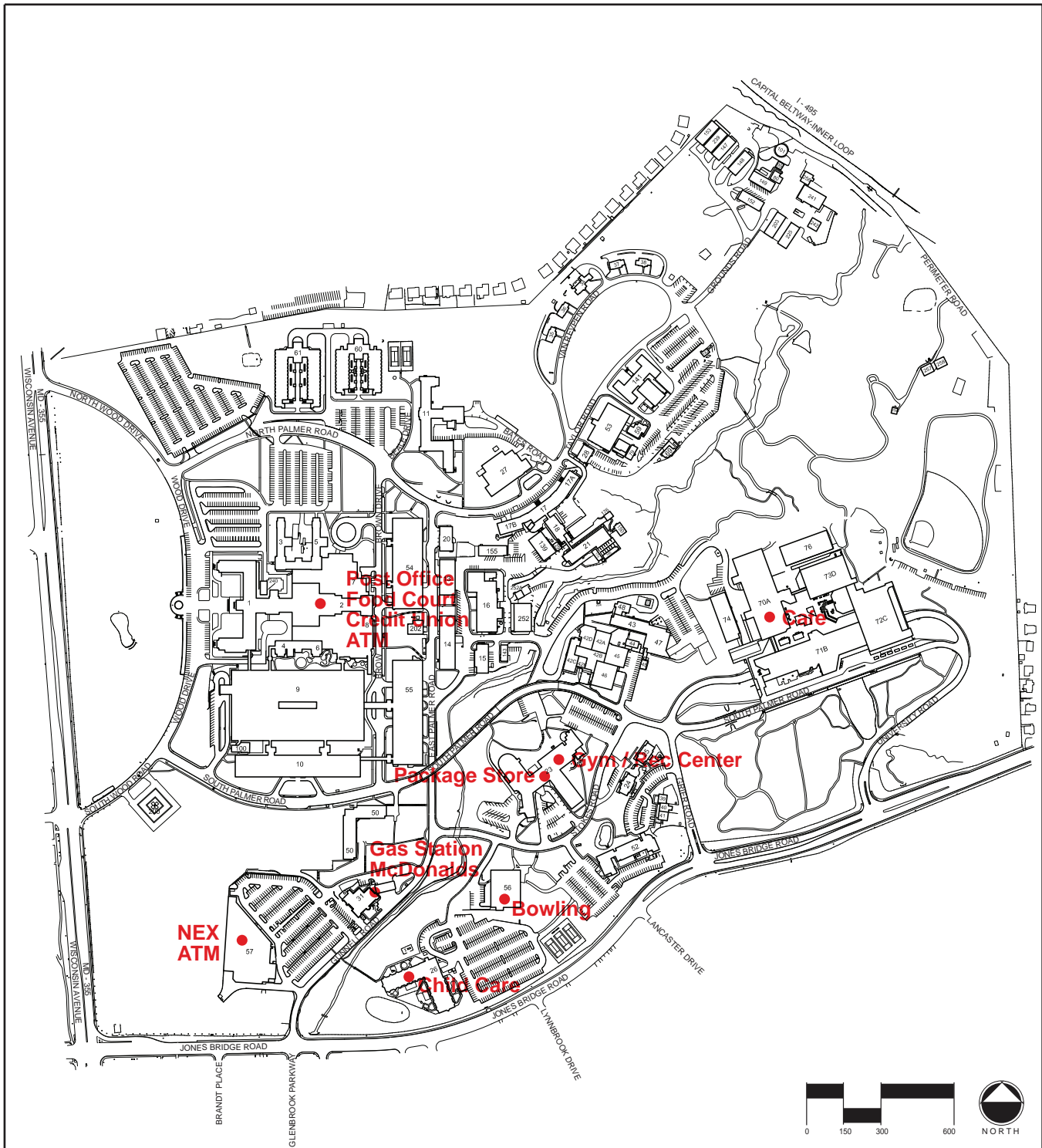
There are many opportunities for recreation throughout the campus adding to the amenities available. Outdoor recreation facilities to include tennis courts, ballfields, exercise trails, and open areas for impromptu activities. More passive recreation areas also exist in the form of picnic shelters and plazas to sit and enjoy outdoor spaces.

In addition to the outdoor recreation, there are multiple indoor recreation facilities throughout the campus. A bowling center is available with 20 lanes. The Comfort Zone is a fitness center that features a 25m pool, cardio room, weight room and other fitness areas. The Liberty Zone features an enlisted club that provides movies, billiards, and other indoor recreational opportunities. In addition to the campus recreation, the MWR information center arranges for recreational trips and activities off campus. Some additional small fitness rooms are located within various buildings for employees.

4.7.4 Services

Amenity services available for employees, patients, and staff are conveniently located. (Figure 4-31 Existing Campus Amenities)

A large selection of eateries are located on “Main Street” in Bldg 2 central to the medical core with additional snack bars located in the bowling alley and



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Figure 4-31

Campus Amenities

the USUHS Café. Vendors and snack machines are located throughout the campus. A full service cafeteria and additional café items are located in the basement of Building 9. A McDonald's fast food restaurant is located next to the Exchange.

The Navy Exchange (NEX) provides a very large retail operation and personalized services to include Optical Shop, Barbershop, Laundry and Dry Cleaning, Tailor, QuickMart, Package Store, Uniform Shop, Flower Shop, as well as printing, film developing, UPS shipping and other services.

A Child Care Center is available for active duty military personnel assigned to the Washington metropolitan area and civilian employees on a space available basis.

Full financial services are available through the Navy Federal Credit Union (NFCU) located on Main Street during normal business hours and 24 hour ATMs are available on Main Street and at the NEX.

Postal operations are provided by the United States Postal Service located on Main Street.

4.8 Historical and Archeological Features

4.8.1 Archeological Resources

In general, the potential for archaeological resources at NNMC Bethesda has been limited by the extensive ground disturbance from farming prior to Navy acquisition and coverage in hardstand and building footprints due to the construction of the hospital complex and later buildings, especially in the western, more developed section of the installation. In the northeast area of the installation, the low rising landforms above the streambeds of the unnamed tributary to Stoney Creek and its tributaries have some potential for archaeology.

No archaeological survey involving fieldwork was done until 2001 when John Milner Associates carried out an Intensive Phase I Archaeological Survey on 36 acres deemed to have moderate to high probability for archaeological resources. Three prehistoric sites were identified, all in the northeastern corner of the campus. The location of the few archaeological sites and areas with archaeological potential are known to Facilities Management, but specific location data are not publicized to prevent vandalism.

Much of the information below is from the Integrated Cultural Resource Management Plan, prepared by URS Corporation for the Chesapeake Division NAVFAC and NNMC in Oct 2002.

NNMC has been subject to four prior cultural resource studies, and one synthesis study. Previous cultural resources studies within the NNMC campus have included intensive archival research, archaeological assessment of potential, and an architectural survey conducted to prepare a Historic and Archeological Resources Protection Plan (HARP), a subsequent Phase I

archaeological survey conducted in accordance with the recommendations of the 1996 HARP, and an updated Cultural Resources Management Plan which re-evaluated the status of both architectural resources and the potential for archaeological resources based on the 2001 Phase I survey.

The 1996 HARP represents a collaborative effort between Elizabeth Anderson Corner/Archeology (EAC/A), Robinson and Associates, and Baker and Associates. This study provided a detailed land ownership and a land use history for the parcels later combined into the NNMC campus, and a history of the conception, initial mid-twentieth-century construction, and subsequent late twentieth-century expansion of the NNMC campus itself. The HARP also provided extensive evidence of widespread soil disturbance within most of the campus in the form of historic photographs from the construction of the historic NNMC core. Based on that level of documented disturbance, subsequent studies have focused on areas outside the historic core as those most likely to retain any potential for *in situ* archaeological deposits.

This approach was explicit in the subsequent Phase I survey conducted within NNMC in 2001. Specifically, that survey addressed areas within the NNMC campus which “MHT identified ...[which] might not have been eradicated by previous construction activities”. These areas included the floodplains, terraces, and adjacent ridge tops along Stoney Creek as it passes through the eastern portion of the NNMC campus. The 2001 Phase I survey encompassed 36 acres within the central-eastern portion of the NNMC campus, and addressed “areas with a slope of less than 8 percent, ...less than 200 m from water, with relatively well drained soils...” The survey also included one area adjacent to officer’s housing which fell outside these characteristics, but which showed minimal evidence of past disturbance. The testing identified three prehistoric sites; two located along the northern floodplain and terrace of Stoney Run (18MO556 and 18MO557), and one on a ridge top south or east of Stoney Run (18MO555). Three prehistoric artifacts interpreted as isolated finds were also recovered. Minor scatters of historic and modern period artifacts were also noted during the survey.

Only 18MO556 was considered to yield temporally diagnostic materials, and was interpreted as a Late Archaic occupation, with no functional interpretation offered. 18MO555 comprised the largest of the three sites, but was restricted to the plowzone. The final site, 18MO557, consisted of two flakes, and was recommended as ineligible for listing in the National Register of Historic Places due to its extremely limited research potential. Further testing to determine the research potential and hence National Register eligibility of both 18MO555 and 18MO556 was recommended, but has not been carried out to date.

The Integrated Cultural Resource Management Plan (ICRMP) prepared in 2002 served to update the campus policy in light of additional research conducted after the 1996 HARP study, including both the 2001 Phase I survey and additional archival research and architectural evaluation

conducted as part of a 1998 preparation of a National Register Nomination Form for a proposed NNMC Historic District encompassing the core World War II features designed by Architect Paul Cret. This latter study did not include additional archaeological survey work.

Finally, most recently, EAC/A conducted a Phase I archaeological identification study of roughly 14 acres in the southeastern corner of the NNMC campus, believed to be the last large, undisturbed area within the campus with the potential to contain in situ archaeological deposits. This survey identified five potential prehistoric sites, and a large area of mixed and apparently redeposited historic materials along the eastern campus perimeter. Based on the amount of prior disturbance noted, these historic materials have not been registered as an archaeological site, and are not recommended for further study.

The five prehistoric sites identified during the survey represent small lithic scatters, mostly of moderate to light density. One site, 18MO648, was interpreted as to be a lithic scatter representative of a short term resource procurement camp, with moderate density and variability within the lithic assemblage. However, the topographic context of this site, and the unusually high gravel content noted in the soil matrix, suggests the some portion of the site may represent redeposit of eroded soils from high on the ridge. The remaining four sites were interpreted as small lithic scatters indicative of short term or single use campsites.

After MHT review, and by letter dated April 18, 2007, all five site were considered not potentially eligible for listing in the National Register as they have little potential to yield significant information through further study, and no further work is recommended for these sites.

4.8.2 Existing Archeological Sites

All eight archaeological sites identified within the NNMC campus represent evidence of past prehistoric populations and land use associated with Stoney Creek, in the eastern portion of the campus. (Figure 4-32 Existing Archeological Sites)

18MO555, 18MO556, and 18MO557 were identified by John Milner Associates during the 2001 Archaeological Identification Survey (Fiedel *et al.* 2001).

18MO555, measuring roughly 70 by 15 meters, consists of a large relatively dense lithic scatter along a hilltop and adjacent slope overlooking Stoney Creek and two of its tributaries. The site produced 31 pieces of quartz debitage and a possible stemmed base, and was tentatively dated to the Late Archaic or Early Woodland Period. It has been recommended as potentially eligible for listing in the National Register of Historic Places, pending further Phase II evaluation studies.



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Figure 4-32

Existing
Archeological Sites

18MO556, measuring roughly 15 by 15 meters, is located along the floodplain and banks of Stoney Creek. This site consist of 59 lithic artifacts, primarily quartz, found in multiple stratigraphic contexts. The site produced diagnostic from both the Late Archaic (a Halifax Point and Bare Island or Duncan's Island type point), and the Early Woodland (a Meadowood blade type perform). The site has been recommended as potentially eligible for listing in the National Register of Historic Places, pending further Phase II evaluation studies.

18MO557, measuring roughly 10 by 5 meters, consist of two quartzite flakes recovered from a hill base along Stoney Creek. Due to its sparse nature, the site was considered to have little potential for additional study, and no further work has been recommended at this site.

18MO644, measuring roughly 40 by 20 meters, is located along a truncated ridge between two tributaries to Stoney Creek and produced eight quartz lithics. The sites is a lithic scatter from an indeterminate period of Prehistory, and included a high proportion of informal tools, suggesting its use for either tool manufacturing or as a multi-task campsite. The site has been disturbed by past NNMC campus development, but the portion of the site disturbed as not been determined. By MHT letter dated April 18, 2007, this site has been determined Not Eligible for listing in the National Register of Historic Places, and no further work is required at this location.

18MO645, measuring 25 by 15 meters, is located on the same ridge as 18MO644, and produced six quartz lithics. The site is interpreted as a lithic scatter indicative of a small campsite, but the high proportion of non-informative debris (chunk and shatter) suggests that little useful information would be provided through additional study. No further study was recommended at this site.

18MO646, measuring roughly 30 by 25 meters, yielded material from both the A horizon and subsoil. The site consisted of nine quartz artifacts, primarily flaking debitage, and is located near the center of a small rise formed by two branches of a tributary to Stoney Creek. 18MO646 is a moderate density lithic scatter tentatively interpreted as a short term campsite where lithic reduction took place. By MHT letter dated April 18, 2007, this site has been determined Not Eligible for listing in the National Register of Historic Places, and no further work is required at this location.

18MO647, roughly 8 by 15 meters in size, is located on a small flat mid-slope on a relatively steep hillside. The site assemblage consists of three quartz lithics, one of which appears to be a biface in the early stages of reduction. Despite the recovery of a tool from this location, the extreme small size of the site, and the high likelihood that the recovered material represents redeposited slopewash, suggests that little useful information would be recovered from further study of this site. No further study of this site was recommended.

18MO648 represents a small concentration of lithics recovered from the extreme eastern edge of the central ridge summit, and extending slightly into the adjacent down slope. The site produced 16 quartz artifacts, and is tentatively interpreted as a short term resource procurement campsite from an indeterminate period of Prehistory. By MHT letter dated April 18, 2007, this site has been determined Not Eligible for listing in the National Register of Historic Places, and no further work is required at this location.

4.9 NNMCM Historic District

“The President’s Hospital” - Congress passed legislation in 1930 to improve naval medical care, but many functions in Washington continued to be housed in buildings at the Old Naval Observatory at 23rd and E Streets N.W. In addition to the office of the Surgeon General of the Navy, a naval medical school, and a hospital, related activities such as a dental school, a medical research institute, and a medical library were all crowded into the limited space at 23rd and E. An ambitious plan for redeveloping the site at a greater density was thwarted by concern for its impact on the surroundings, particularly the nearby Lincoln Memorial.

In 1937 Congress specifically authorized and funded the construction of a new naval medical complex, but a new site had to be selected. By this time, the requirements were not just for a medical school and hospital of the highest quality, but for the Naval Dental School, the Naval Medical Research Institute, and a Hospital Corps School for the WAVES (Women Accepted for Volunteer Emergency Services), and facilities for various occupational and recreational activities. Residential and support facilities for doctors, nurses, and corpsmen were also needed.

President Franklin D. Roosevelt (a former assistant Secretary of the Navy) assumed an active role in both the conceptual design and the site selection for the complex. In 1937, Roosevelt, impressed by the modernist design of the 1924 Nebraska State Capitol designed by Bertram Goodhue, drew a rough sketch on White House stationery of a plan and elevation for a building of similar architectural character. When the selection of a site for the new naval medical center bogged down in controversy, Roosevelt invested his own time visiting many potential sites and made the selection himself. The farmstead on the road to Rockville in rural Montgomery County, Maryland appeared healthy in aspect, convenient to the capital, and spacious enough for new building with room for expansion.

The realization of Roosevelt’s notional design was assigned to the Navy’s Bureau of Yards and Docks (BuDocks). Fortunately, the execution of the design was supervised by the distinguished consulting architect Paul Philippe Cret working in cooperation with BuDock’s Frederick Southworth. The scale of the central building increased but followed Roosevelt’s basic plan. The core complex of buildings was built between 1939 and 1941 and dedicated by President Roosevelt on August 31, 1942. The timing of its completion was fortuitous in that World War II was then well underway.

Over time the Bethesda complex acquired new tenant commands, often geared to the particular requirements of military medicine. The Naval School of Hospital Administration, the Naval Toxicology Unit and the Armed Forces Radiobiology Research Institute were among them. One example of the focus on medical care that related to the circumstances of naval service is the research carried out at the Naval Medical Research Institute on decompression making use of hyperbaric chambers. In 1973, the hospital and the tenant commands were combined in one organizational structure called the National Naval Medical Center (NNMC). Also during this period, a single armed services medical school, the Uniformed Services University of the Health Sciences (USUHS) was built at the southeastern corner of the NNMC property.

The central building, known as the Central Tower Block or Building 1, became the hospital of choice for the medical care of the President of the United States and a designated Presidential Suite was fitted out in the tower.

Historic Significance of the Bethesda Naval Medical Center

The historic significance of NNMC Bethesda lies in many areas. First, it has provided care to thousands of American service personnel over a 60-year period stretching from World War II through the Korean Conflict, the Vietnam War, and today's wars in Iraq and Afghanistan. It has also served as the "hospital of Presidents", and maintains a medical suite for the President of the United States in the Central Tower Block. Research carried out at NNMC Bethesda has contributed to many medical achievements such as blood vessel and bone grafting techniques, radioactive treatment of tumors, and improved prostheses. The architectural distinction of its original Art Deco and then "Stripped Classical" buildings has been joined by a mature designed landscape that contributes to an ambience of calm and healing. Lastly, as the facility at the apex of the Navy's medical practice, it has diffused developments in the best practices of military health care throughout the Navy's medical system.

The official designation of historic properties at NNMC Bethesda reflects the complex and multilayered significance of the installation: its cultural landscape, its architecturally distinguished buildings, the events that have taken place there, and its association with famous individuals, especially President Franklin D. Roosevelt. These aspects have qualified most of the installation under several of the formal Criteria of Eligibility for the National Register of Historic Places (NRHP).

Since the passage of the National Historic Preservation Act (NHPA) in 1966, the standards for documenting resources eligible for the NRHP have become more professional and systematic. The history of cultural resource surveys at NNMC reflects this evolution in that it began with a National Register nomination of the installation's major landmark, the Central Tower Block, in 1975 and only achieved a systematic evaluation of the NRHP eligibility of all buildings and structures in 1998.

Eligibility for the NRHP is established according to the official Criteria of Evaluation issued by the Department of the Interior. In broad terms, evaluation criteria are based on the following factors:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

1. That are associated with events that have made a significant contribution to the broad patterns of our history; or
2. That are associated with the lives of persons significant in our past; or
3. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
4. That have yielded or may be likely to yield, information important in prehistory or history.

Documentation of Bethesda's Historic Resources

Since the passage of the National Historic Preservation Act in 1966, the standards for documenting resources eligible for the NRHP have become more professional and systematic. The history of cultural resource surveys at NNMC reflects this evolution in that it began with a National Register nomination of the installation's major landmark, the Central Tower Block, in 1977 and only achieved a systematic evaluation of the NRHP eligibility of all buildings and structures in 1998. Because of the general rule that resources must be at least 50 years old to qualify for eligibility unless they are of outstanding significance.

4.9.1 Architectural Resources

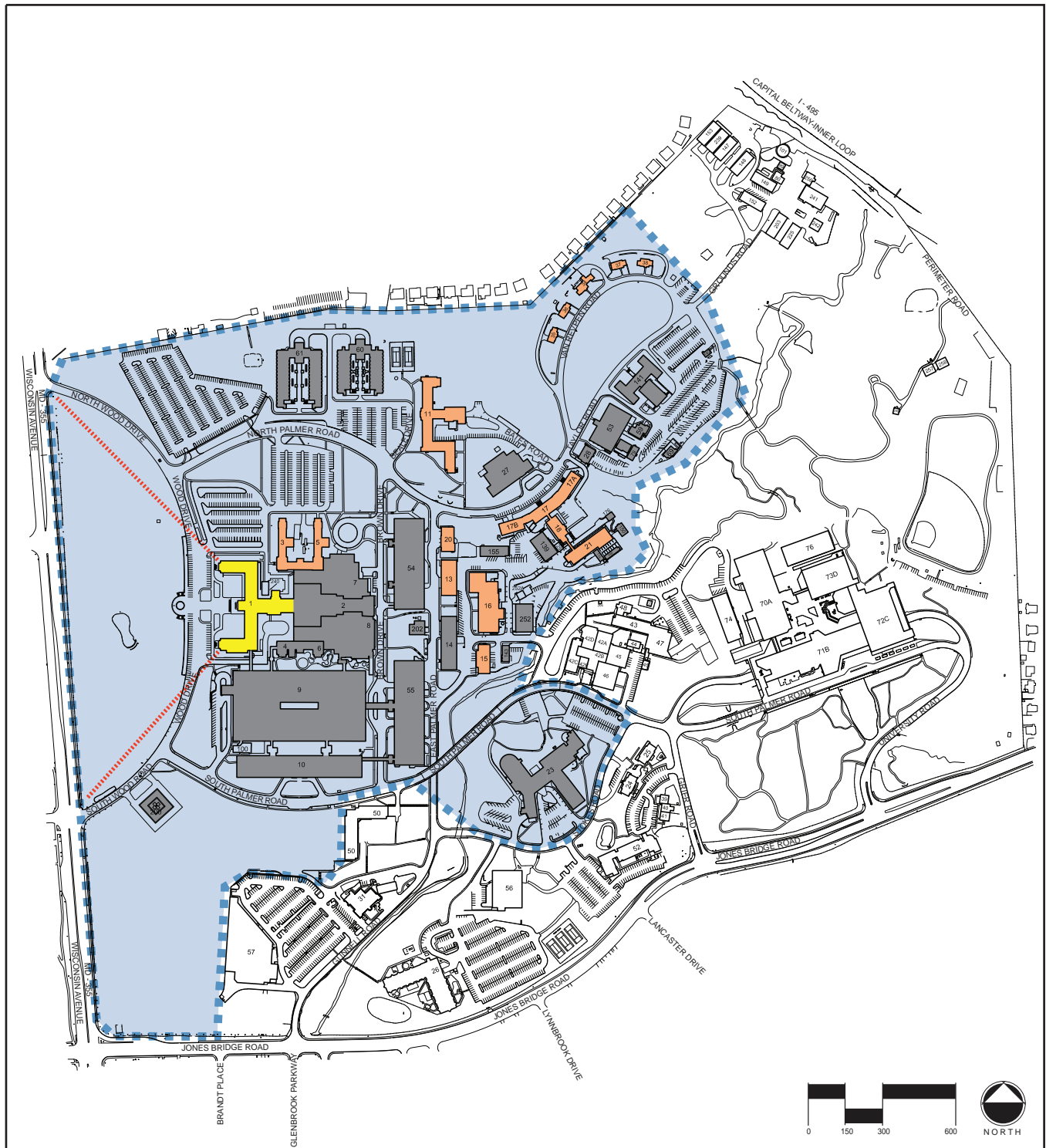
As indicated above, the first action to comply with NHPA Section 110 survey requirements for NNMC Bethesda was the drafting of a nomination to the NRHP of the Central Tower Block by Chesapeake Division, Naval Facilities Engineering Command (CHESDIV). The NRHP form referenced architecture, science, military, and education as "areas of significance" and gave the dates of 1939 to 1942. It was accepted for listing on the National Register in March, 1977.

In 1996, a Phase I Historic and Archaeological Resources Protection Plan (HARP Plan) was drawn up by Baker Associates for the installation. This document, a management plan rather than a survey, did however incorporate a working inventory of potentially NRHP eligible resources that included the later buildings designed under the overall direction of Paul P. Cret, which were stylistically similar to Building 1. It was followed in 1998

by a comprehensive survey, also prepared by Baker Associates, which documented the architectural development of the medical complex during the period 1940 to 1945 and proposed a 131-acre historic district. The historic district contains 18 buildings and 1 landscape feature, (the lawn between Building 1 and Rockville Pike) that are deemed contributing and 18 buildings that are non-contributing. (Figure 4-33 Existing Historical District) The historic district boundaries are irregular in shape but take in approximately a third of the 242 acre installation toward the west and north. The row of Colonial Revival Flag officers quarters to the northeast of the installation are the only architectural resources that differ from the Stripped Classicism style of the ensemble. The survey indicated that the district was eligible for the NRHP under Categories A, B, and C, and particularly for its association with Franklin D. Roosevelt and Paul Philippe Cret. The historic district was accepted as NRHP eligible by a consensus determination between the Navy and the Maryland State Historic Preservation Officer.

Table 4.9.1 Historic District Contributing Structures

| Building No. | Historic Name | Date | National Register Status |
|--------------|----------------------------------|---------|-----------------------------------|
| 1 | Main Hospital Tower | 1941 | Listed in 1977 |
| 3 | Subsistence & Recreation Wing | 1942-43 | Contributing to Historic District |
| 5 | Hospital Ward | 1942-43 | Contributing to Historic District |
| 11 | WAVES Barracks | 1941 | Contributing to Historic District |
| 12 | Corpsmen's Quarters | 1941 | Contributing to Historic District |
| 13 | Laundry and Garage | 1941 | Contributing to Historic District |
| 15 | Public Works Shop | 1944 | Contributing to Historic District |
| 16 | Power Plant | 1941 | Contributing to Historic District |
| 17, 17A, 17B | Naval Medical Research Institute | 1941-44 | Contributing to Historic District |
| 18 | Animal House | 1942 | Contributing to Historic District |
| 20 | Firehouse | 1944 | Contributing to Historic District |
| 21 | Animal House | 1946 | Contributing to Historic District |
| 30 | Flagpole | 1941-42 | Contributing to Historic District |
| 34 | Surgeon General's Quarters | 1941 | Contributing to Historic District |
| 35 | Officer's Quarters | 1941 | Contributing to Historic District |
| 36 | Officer's Quarters | 1941 | Contributing to Historic District |
| 37 | Officer's Quarters | 1941 | Contributing to Historic District |
| 38 | Officer's Quarters | 1941 | Contributing to Historic District |
| | Landscape | 1941-45 | Contributing to Historic District |



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- HISTORIC DISTRICT
- HISTORIC LANDMARK
- CONTRIBUTING STRUCTURE
- NON-CONTRIBUTING STRUCTURE
- PROTECTED HISTORIC SIGHTLINE

Figure 4-33

**Existing
Historical District**

It is quite clear that the Central Tower Block with its iconic design, vertical thrust, lateral symmetry, and commanding presence overlooking the lawn sweeping down to Rockville Pike is the prime landmark of the medical center. Its high style Art Deco entrance lobby is the only important historic interior present at the complex. Later periods of development at the installation have all accepted the primacy of this building and its setting as a determinant of future planning.

4.9.2 Historic Landscape Resources

Not as well documented, but of obvious importance is the rolling terrain with mature trees and plantings that characterize the majority of the property. There is an evident transition from the formality and limited planting of the Central Tower Block's lawn with its terrace and flagpole on axis with the building's entrance and an increasingly naturalistic landscape determined by wooded stream valleys further to the east. Further research remains to be done on the significance of NNMC Bethesda as a "cultural landscape" rather than just a complex of historic buildings.

4.10 Environmental Features

4.10.1 Climate

NNMC is located in west-central Maryland at 39°00' N latitude and 77°09' W longitude, within the temperate continental climate of the United States. Located between the hotter south and colder north, the area can be hot and humid in the summer, and receive heavy snowstorms in the winter. Hot summer weather and high humidity due to the dominance of maritime tropical air combine to form showers and thunderstorms common in the summer months. Fall is generally mild and warm, while winter ranges from mild to stormy with relatively cold temperatures. Spring is the nicest time of year for the area with low humidity and temperatures on the rise.

The mean annual temperature is 57° F. Monthly mean temperatures vary little throughout the summer staying in the 70's and winter seasons in the 30's , but they are quite variable through the transition seasons of fall and spring. The January normal high is 43° F and the normal low is 27° F. The hottest month is July with a normal high of 88° F and the normal low is 70° F. Temperature variations between night and day tend to be fairly limited during summer with a difference that can reach 18 degrees Fahrenheit, and fairly limited during winter with an average difference of 16 degrees Fahrenheit.

Typically, the highest average relative humidity occurs in the early morning hours and drops during the day as the temperatures increase in the afternoon. The highest humidity is predictably in the summer months from June to August.

The average annual precipitation as measured at Ronald Reagan Washington National Airport is just over 39.0 inches. Rainfall in is fairly evenly distributed throughout the year. The wettest month of the year

is May with an average rainfall of 3.82 Inches. February and April are historically slightly drier months. Winters typically see approximately 15 inches of snowfall, typically with slightly more in February than the other winter months.

4.10.2 Air Quality

Washington, DC and the surrounding regions, to include Maryland's Montgomery County, exceeds the ozone pollution limits as established by the National Ambient Air Quality Standards (NAAQS). Ozone is a harmful air pollutant created when sunlight interacts with certain air pollutants, such as hydrocarbons. As a result, an air quality plan has been developed by the Metropolitan Washington Air Quality Committee (MWAQC) to address air pollution. The plan goes beyond Clean Air Act requirements in an effort to gain further reductions in fine particle pollution and was approved in March 2008 and will be submitted to the EPA. The Plan, called a State Implementation Plan (SIP), presents air quality data showing the region will meet the federal standard for ozone by the fall of 2009. (MWCOG)

For the NNMC campus, the major sources of air pollutants are the energy plant (building 16) and auto and truck emissions. The energy plant was originally constructed to burn heavy bunker oils that produced high concentrations of sulfur oxides, oxides of nitrogen and suspended particulates. Building 16 has since been converted to natural gas, which produces significantly less air pollutants and uses heating oil as backup for periods when natural gas is unavailable. The next significant source of air pollutants is autos and truck traffic. A significant pollutant for this source is carbon monoxide. However, as emission technology has evolved, this source of pollution has decreased and should continue to into the future.

4.10.3 Solid Wastes

Waste products that are generated at NNMC are classified according to federal and state regulations. NNMC has programs to minimize the waste products generated and strictly adheres to state requirements for disposal. These regulations define procedures for storage, transport, and disposal. NNMC Environmental Department is responsible for the program and maintains a certificate registering NNMC with the Montgomery County Fire and Rescue Service.

NNMC generates solid waste including various chemicals from research, metal recovery from dental, and expired batteries. NNMC also generates medical waste which is contained at the point of origin and labeled in accordance with regulations before being transported.

Chemical waste from the hospital is transferred to Building 256, a permitted storage and disposal facility and then picked up and disposed of by contracts through the Defense Reutilization and Marketing Service (DRMS) at Ft Meade. All disposal complies with federal, state and local environmental laws and regulations, including the Resource Conservation Recovery Act

(RCRA). Other tenants on campus, USUHS and AFRRRI, have independent contracts to handle their chemical waste and a Regulated Medical Waste (RMW) contractor for the entire campus. They have regularly scheduled pick ups from the RMW secure location in Building 55 for the hospital complex and additional pick up points from tenants at other locations on campus. Medical waste is incinerated. (Brandt, C)

General waste includes waste that does not contain solid or medical waste materials. Office waste, disposable products, food waste, maintenance materials and building materials are included in this category. General waste is collected throughout the campus. Programs to encourage recycling are run through the Environmental office. Recycle containers are located throughout the campus to recover recyclable materials. Private contractors transport this waste off campus.

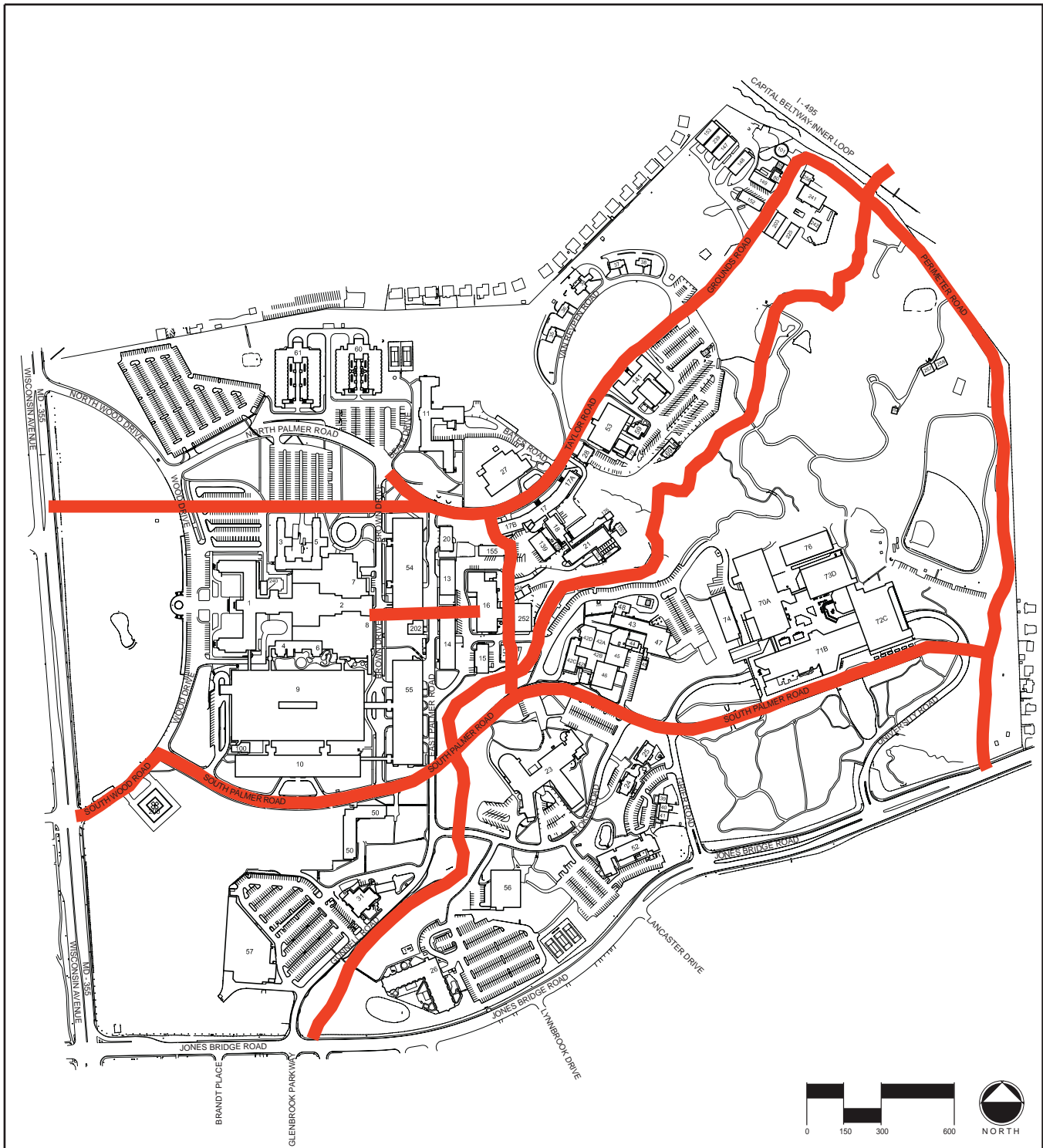
Construction or demolition materials for a specific project are handled by the building contractor through the project specifications. Typically debris is removed from the site and hauled off campus by the general provisions of the specifications and is included in the cost of the project. Hazardous materials associated with demolition are still handled by the contractor but are disposed of in accordance with applicable federal and state regulations.

4.11 Existing Utilities

See Figure 4-34 Existing Major Utility Corridors

4.11.1 Electrical

Each of the four 13.8 Kilovolts (KV) feeders from the Woodmont substation 80 terminates onto a Federal Pacific Electric (FPE) switchgear lineup. According to PEPCO the four feeders have a total capacity of 35 MVA. The feeders have the following PEPCO identification numbers: 14846, 14847, 14848, and 14849. PEPCO's highest recorded peak power demand on these feeders is approximately 18 MegaVolt-amps (MVA). Therefore, the primary feeders from the Woodmont substation are operating at 51% of load capacity. These four switchgear lineups are interconnected into a ring bus configuration so that in the event of a single feeder failure, all the switchgear remains on-line. Vault #243 and FPE switchgear was installed in the early 1980's as part of Buildings 9 and 10 construction project. There are 17 primary feeders from this group of switchgear. The 17 feeders supply primary power to various distribution switchgear locations throughout the campus. Four primary feeders supply Buildings 1 and 2. One of the primary feeders that serve Building 2 is tapped to feed Buildings 4 and 6. One feeder supplies Buildings 3 and 5. Two feeders supply Buildings 9 and 10. The remaining feeders exit the underground vault #243 at the north wall of the vault and travel through a utility tunnel system until they exit the back of Building 2 where they basically begin to fan out to distribute primary power to buildings throughout the campus.



— MAJOR UTILITY CORRIDOR

Figure 4-34

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**Existing Major Utility
Corridors**

The two feeders from the NIH substation 167 terminate at switchgear in the Uniformed Services University of Health Sciences (USUHS) Complex. The feeders have the following PEPCO identification numbers: 14117 and 14118. According to the PEPCO the highest recorded peak power demand on these feeders is approximately 2.8MVA. They have a capacity of 12.5MVA so they are operating at 22% of load capacity.

These two feeders serving USUHS are interconnected with the feeds at the medical center's vault #243. This is 2-way emergency (normally-open) interconnection such that in the event that medical center experiences a failure on all their Woodmont substation power feeds the USUHS feeds can be used as partial backup feed to the Medical Center if needed. And, in turn, if USUHS experiences a failure on their NIH substation 167 feeds, the Medical center's feeds can be used as a partial backup to USUHS. PEPCO has complete control over the operation of tying the two facilities together if necessary.

Most of the on-campus building transformers, outside primary switchgear and underground primary cabling were replaced in a utility upgrade project that began in 1998 and was substantially completed by 2002.

The electrical systems for each building on campus were evaluated. Please refer to the Existing Conditions Built Environment section of this master plan and Appendix A for Building General Conditions Assessments.

4.11.2 Communications

The National Naval Medical Center (NNMC) Bethesda Maryland has a Northern Telecom (Nortel) – Meridian 1 Option 81C telephone switch with a Pilot Voice Mail System, and is approximately 10 years old. The switch is served from a Verizon central office via ten T1 lines. The system has approximately 4,500 lines in use and has the capacity of 16,000 users.

The Medical Center's data systems are based in the main computer room located in the Information Technology Building 11.

The existing communications ductbank and manhole system throughout the campus is in fair overall condition.

Fire Alarm signals are reported to the Fire Station Building 20 via telephone to the Signal Communications Vision 21 monitoring system located in Building 20.

4.11.3 Mechanical

Many of the buildings on the NNMC campus are provided with heating and cooling from the central energy plant which is located in Building 16. The central energy plant consists of multiple water chilling units and steam boilers. All pumps, controls, water treatment systems, equipment, and piping systems for the operation of the central heating and cooling plant are located in Building 16. In addition to the NNMC campus central utilities,

many of the buildings are provided with individual cooling and heating equipment.

Central Cooling Plant: The central plant incorporates nine (9) centrifugal water chilling units rated at approximately 1,500 tons of cooling each. In addition to the water chilling units, there is one (1) gas fired absorption water chilling unit in the plant that is currently out of service. Condenser water from the chillers is piped to a three cell cooling tower located to the southeast of the central energy plant. The tower has been designed to accept the addition of a fourth cell to increase the plant capacity. The current plant cooling load can be met with the operation of seven of the nine water chilling units. Two of the 1,500 ton chillers are held in reserve as back up systems for the medical complex and can be brought on line if any of the active chillers fail. There is room for the chilled water plant to expand by removing the absorption unit and installing an additional centrifugal water chilling unit and adding another cell to the cooling tower.

Chilled Water Distribution: A network of tunnels and direct bury chilled water supply and return piping provides chilled water from the central energy plant in Building 16 to many of the buildings at the NNMC. Most of the loads currently connected to the chilled water loop are associated directly with the Medical Center Buildings. However, assorted other buildings throughout the campus are also connected to the central utility plant. There are five main chilled water lines exiting the chiller plant to groups of buildings.

The first loop exits the chiller plant through a tunnel and serves the hospital and supporting buildings. The buildings connected to this pipe loop are Medical Center Buildings 1-10, along with Buildings 14 (facilities management), 50 (BEQ), and 54 and 55 (parking deck with admin spaces). Buildings 1-10 and 54 are served directly from the chilled water lines in the tunnel between the central chilled water plant and the medical center. Building 55 is served from chilled water lines in a tunnel branching off of the main utility tunnel to the Medical Center. Building 50 is served through a 5 inch direct buried chilled water line, originating from the main chilled water loop in building 10. Building 14 is served from a 4 inch direct buried chilled water line branching off of the main chilled water line in the tunnel serving the medical center.

The second chilled water loop extends to the north to include Buildings 11 (admin), 60 and 61 (BEQ's). This chilled water loop is direct buried 10 inch chilled water pipe. After branching off to serve building 11, the line sized is reduced to 8 inches.

The third loop extends to the northeast and includes Buildings 17, 17A, 17B (Nav Med Research Center), 18 (Nav Med Research Institute), and 139 (Research). A direct bury, 16 inch chilled water line exits the central energy plant and branches off to a 6 inch line serving the building 17 cluster and a 2 inch direct bury line serves building 139. There appears to have been other buildings connected to this loop in the past, explaining the large 16 inch main serving two relatively small building groups.

The fourth loop is a 6 inch, direct bury pipe system serving only Building 21 (Naval Medical Research Center).

The fifth loop serves the 40's series buildings which encompass the AFFRI complex, the 70's series buildings which is the USUHS Complex, building 23 (recreation building), 56 (bowling alley) and 57 (Navy Exchange). This loop originates at the central energy plant as a 24 inch pipe, direct bury pipe. Near the cooling towers, the loop branches to the north as an 18 inch pipe and to the south as a 10 inch pipe. The north branch provides a 10 inch and a 6 inch take off to the 40 series buildings with the 18 inch line continuing to the 70 series buildings. The south branch, of the 24 inch main, consists of a 10 inch pipe. This line provides a 6 inch line to building 58 and a 8 inch line to building 57.

In all, there are approximately forty buildings on the NNMCM campus connected to the central cooling plant. Of those buildings, several are currently unoccupied and impose no load on the current operation of the chiller plant.

Central Heating Plant: The central heating plant is located in Building 16 with the central cooling plant. The heating plant consists of four (4) high pressure steam boilers. Each boiler has a capacity of approximately 30,000 pounds of steam per hour, giving the plant a total capacity of 120,000 pounds of steam per hour. Current operation and loads require that only three of the four boilers be on-line to meet the campus heating loads. The fourth boiler is used as a stand-by boiler. There is space in building 16 for additional equipment. This space is where a fifth boiler was removed. Condensate return pumps, dearators, feed water heaters, and chemical treatment systems are located near the boilers in Building 16.

Steam and Condensate Distribution: A system of underground steam and condensate return lines are routed from the central heating plant to most non-single dwelling facilities on the NNMCM campus. Steam and condensate lines exit Building 16 in multiple directions, serving different areas of the campus. In general, the steam utilities serving the larger buildings provide domestic heat for those buildings along with the energy source to generate domestic hot water for those buildings.

Major steam and condensate lines exit through a utility tunnel from building 16 to the Medical Center Complex. The buildings that are connected to this steam line are buildings 1-10 and parking decks 54 and 55. A 3 inch steam line and 2 inch condensate return line branches from that main continues to the south to serve Buildings 50, and 57. All three of these buildings are served by 3 inch steam lines and 2 inch condensate return lines with no changes in sizes to the main. Another set of steam and condensate return lines (size unknown) exits building 3 of the medical complex and extends to buildings 60 and 61. Additionally, another set of steam and condensate lines branches from the utility tunnel to serve buildings 13, 20 and 11. These lines run through buildings 13 and 20 and proceed underground to building 11.

The second steam main (5 inch steam and 3 inch condensate return) exits from the north side Building 16 and continues underground to other support buildings, including Buildings 17, 17A, 17B, 27, 17, 17A, 17B, 27, 28, 53, 59, 80, 139, 141, 147, 148, 149, 152, 153, 154, 155, 203, 225, 241, 242, 256 and 239. This is the longest of all of the underground steam mains and is supported by several steam man holes for connections and several expansion loops.

The third steam and condensate main consists of buried 5 inch steam and 2-1/2 inch condensate return lines, departing from the east side of the heating plant and travels to Building 21.

The fourth steam and condensate main (10 inch steam and 5 inch condensate return) also exits underground on the east side of Building 16. It continues to near the cooling tower where it branches to the north as an 8 inch steam and 4 inch condensate return line and south as a 4 inch steam line and 2 inch condensate return line. The north branch continues to the east to serve the 40's series buildings (AFFRI) and the 70's series buildings (USUHS). The south branch off of the main continues to the south to serve Buildings 23 and 56.

The condition of the underground steam and condensate lines is currently unknown. However, the Bowling Alley, Building 56, has recently installed a stand alone heating system due to multiple leaks in the steam lines originally serving the building. It can only be assumed that the same condition may exist in other areas too. Steam manholes are regularly located and some show signs of steam leakage.

4.11.4 Water

Water for NNMC is provided by Washington Suburban Sanitary Commission (WSSC). The supply lines in the area are 10" and 12" lines and there are four metered connections to NNMC, two from west and two from the south. The campus is isolated from WSSC's mains with reduced pressure backflow preventers (RPBP). With the exception of one building complex, the campus's water system is in turn isolated from the individual buildings with RPBPs. However, the one exception is the Armed Forces Radiobiological Research Institute, building 46, which does not have a RPBP. For the protection of the water system and all the users of the system, this building complex should be retrofitted with a RPBP.

The capacity of WSSC water system is considered adequate for any future water demands. However, in an effort to verify the current and future capacity of the existing campus water system, a limited study was conducted of the campus water distribution system on December 5 and 6, 2006. Pressure recorders were installed across the campus and individual fire hydrants were open and closed one at a time. The flow rate for the specific hydrant was recorded, while the pressure recorders captured the system's pressure response. Each fire hydrant was allowed to flow for approximately 15 minutes to allow time for the campus distribution system

to reestablish pressure equilibrium. After the conclusion of the flow tests, the pressure recorders were left in place for a total of 24-hours to capture a full campus pressure cycle. It should be noted that the flow tests did not meet the requirements of NFPA 291. Instead the specific test locations and flow parameters were established to develop and measure the system's response to specific stresses.

A simplified model of the campus water distribution network was developed from campus utility maps. The distribution model was simplified by deleting pipelines less than 6-inches in diameter and were possible grouping individual buildings into demand nodes. Heastad Method's WaterCAD software was used for the modeling. The data collected in the field was down loaded to the modeling software package. In addition, to develop average daily demands for the campus, master water meter readings were obtained from WSSC. The roughness coefficients, pipe sizes, and valve statuses were then adjusted in order to replicate the results recorded in the field. Anticipated fire demands were obtained from the campus and was used to stress test the model. Results from the modeling should be used with caution given the limited time that data was collected, 24-hours, and assumptions concerning distribution system pipe sizes and routing, valve status (open or closed) and valve locations. Therefore, results of this water model should not be used in place of design specific hydrant flow tests complying with NFPA 291.

However, despite the limitations of the model, the model indicates that the existing campus water distribution system for the most part is adequate for current demands and the future demands anticipated with the facilities proposed in master plan. In the event increased capacity is required, there are adequate looped lines in the area to provide additional supply to the campus.

4.11.5 Sanitary Sewer

Sanitary sewage is collected by the campus's gravity sewer system and delivered to the WSSC's mains for treatment at the Blue Plains Treatment Plant. WSSC's mains run though the approximate center of campus flowing from southwest to northeast along Stoney Creek. During a site investigation conducted on December 6 and 7, 2006 visual estimates of system capacity were made at key points along the WSSC's mains and at critical points on the campus system. The time chosen for these observations roughly corresponded with the expected peak daily flow for the campus. A spread sheet model was developed from these estimates. The results of this modeling indicate that the current capacity of the WSSC system is adequate for present conditions and proposed master plan expansions.

4.11.6 Storm Water

Storm water from the campus is conveyed by a series of storm systems that discharge into the tributaries of Stoney Creek on NNMC, then to Rock Creek and eventually into the Potomac River to the northeast. Information

obtained from an earlier study indicates that most of the existing storm system is designed for 10 year storm events. This creek flows from southwest to northeast through the approximate center of the campus. According to PWC there have been no reports of significant flooding during normal rainfall events.

The NNMC campus does not have a category exemption from storm water management requirements. As a result, all future projects will be required to comply with Maryland Stormwater Management Guidelines (MSMG). These guidelines establish minimum storm water quality standards and maximum storm water discharges from a given site. Projects that will be impacted are new construction over 5,000 SF of disturbed area and redevelopment of existing impervious areas of 5,000 SF and more. For redevelopment projects, MSMG requires a net reduction of 20 percent of the existing impervious area. Given that some areas of the campus are highly developed, the land area required for the treatment of storm water for quality and detention for quantity may be difficult to obtain without expensive subsurface structures, such as detention piping, vaults, etc.

Stoney Creek is the receiving stream for much of the runoff for the Bethesda campus. In the past, storm water discharge to this creek has caused erosion at the points of discharge from the respective storm systems. Stream bank damage has occurred due to the increase in storm runoff resulting from the increase impervious areas both outside and within the campus, i.e. buildings, parking areas and roads. As discussed above, current Maryland Stormwater Management Guidelines addresses both new developments and redevelopments. As a result, as new construction and redevelopment occur, the creek's environmental condition will improve.

4.11.7 Natural Gas

Natural gas supplied by Washington Gas is available on the campus. The existing energy plant (building No. 16) is supplied gas by way of a dedicated 8-inch 50 psi gas main. No other users are connected to this main. The gas supply is provided on an interruptible basis. As a result, the energy plant has fuel oil back up should the gas supply be interrupted. A separate 6-inch 20 psi gas main supplies the hospital and a limited number of smaller users. Gas volume and pressure are considered adequate for current and future needs.

Independent small low pressure gas distribution systems from Washington Gas lines provide gas service to the existing flag officer residential area in the north and the Child Development Center in the south. While adequate for the existing residential area, the capacity of this system is limited and would not be adequate for significant additional gas loads.

4.12 Opportunities and Constraints

There are both built and natural environment constraints and opportunities on NNMC campus, all of which were considered in the master plan update.

4.12.1 Built Environment

There are several constraints within the built environment on NNMC. The most significant are the historically significant facilities, the helicopter approach zone, and the Antiterrorism / Force Protection (AT / FP) requirements. (Figure 4-35 Issues & Constraints)

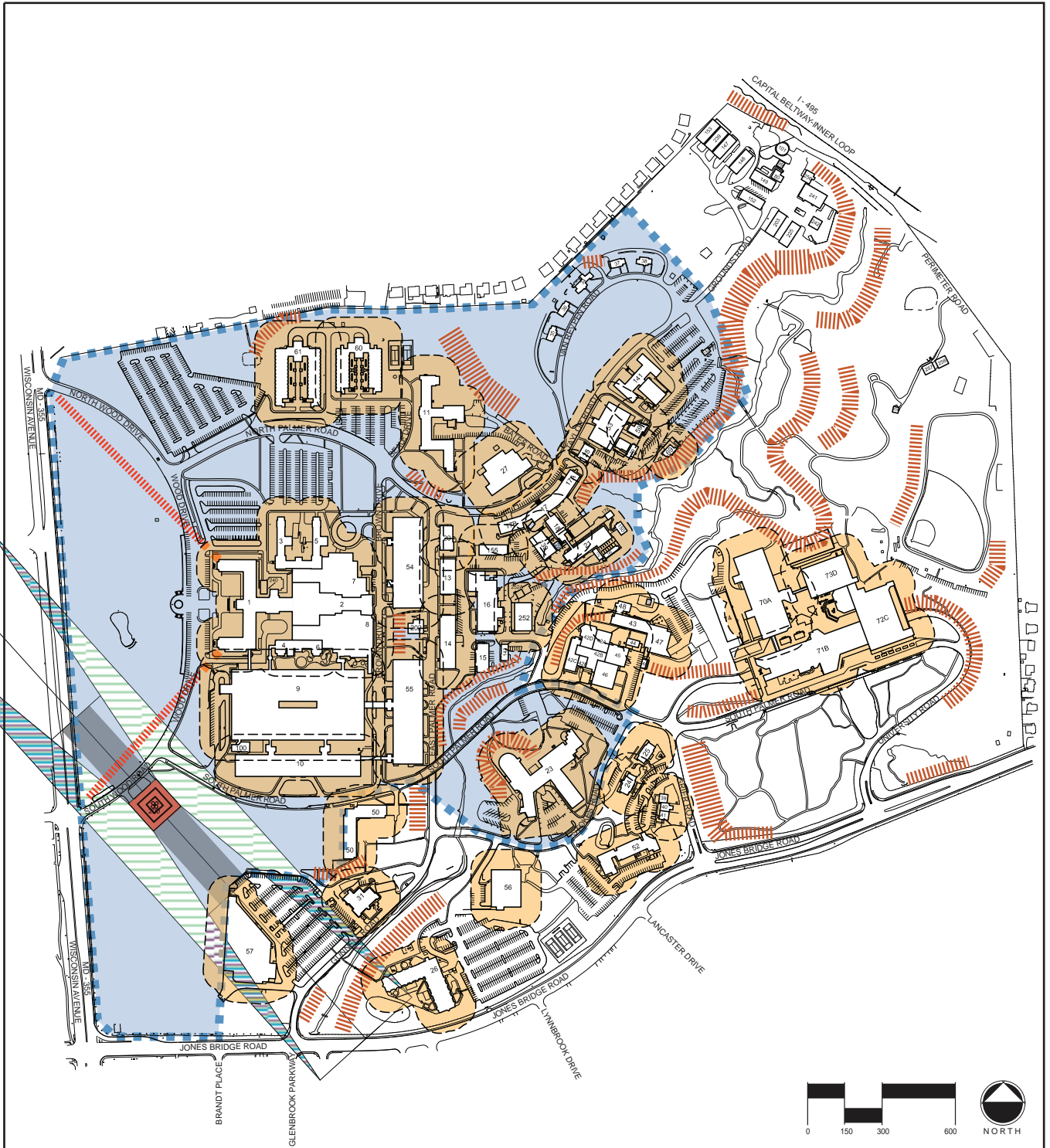
The tower, Building 1, is listed on the National Register of Historic Places. In addition to the tower itself, the view shed of and from the tower to Rockville Pike is also protected by this designation.

In addition to Building 1, the tower, there are also additional buildings on campus that have historical significance, although they are not on the National Register of Historic Places. The Integrated Cultural Resources Management Plan (ICRMP) 2002, identifies the facilities that are listed, contributing or non-contributing in terms of historical significance. These are discussed in more detail in the Cultural Resources portion of this Master Plan.

The second significant constraint within the built environment is the helicopter approach zone. Designated as structure 200 on the real property records, the helipad is to the southwest of Building 10. The airspace of the approach from the south and north are restrictive in terms of the height of any structure allowed within these multiple zones. The airspace restrictions are detailed in UFC 3-260-01, 1 Nov 2001 with changes 19 May 2006, Airfield and Heliport Planning and Design.

The combination of these two manmade constraints effectively preserves the status quo of the area of the NNMC which fronts Rockville Pike in the semicircular drive.

The third significant built environment constraint is the AT/FP criteria as designated in UFC 4-010-01, Oct 2003 (rev Jan 2007), DoD Minimum Antiterrorism Standards for Buildings. While the historical significance and heliport planning zones will affect particular areas of the installation development AT/FP criterion affects the entire installation and all future development. The standards in the UFC are very specific based on various situations, but in general, for an installation with a controlled perimeter such as NNMC, this criterion requires new conventional construction with occupancies greater than 50 people to maintain an 82' setback from all roads and parking. Construction of facilities with a lower density require a 33' setback. Renovation projects must comply with the criteria if the renovation is more than 50% of the building's replacement value. In addition, there is a 148' standoff distance required from the controlled perimeter or fenceline around the installation. There are provisions in the criteria that allow reduced setbacks with a blast analysis and construction modifications that would be equivalent to the required setbacks. The basis of design for the current contract for the new medical additions and parking structures has been approved by NNMC security to allow the parking structures to be within 33' of existing structures, rather than the 82' normally required



NNMC
Master Plan
Update 2008
Bethesda Campus

- 82' ATFP ZONE
- STEEP SLOPES (OVER 15%)
- HELIPAD PRIMARY SURFACE
- HELIPAD CLEAR ZONE
- PROTECTED HISTORIC SIGHTLINE

- HISTORIC DISTRICT

Figure 4-35

Issues and Constraints

with the understanding that if the existing structures are renovated in the future by more than 50% of their value, a blast analysis must be complete to incorporate any required provisions in the renovation.

Some of the manmade opportunities are to capitalize on the positive features already established on the campus in terms of the well defined functional zones and expand within these areas as required to maintain efficient operations. Opportunities exist to improve existing circulation, both vehicular and pedestrian, while recognizing the positive features and traffic patterns already established. Where economically feasible, there are opportunities to renovate facilities that have been identified as contributing to the historical significance of the campus.

Another opportunity presents itself in the constraint of the AT/FP setbacks. While creating a constraint in terms of siting new facilities, the setbacks are also an opportunity to maintain an open campus feel, provide areas that can enhance the natural environment on campus, provide walkways, bikepaths, and cluster areas for low plantings and seating.

4.12.2 Natural Environment

There are several natural constraints and opportunities as well. One of the most significant natural features is the topography of the campus. There is a difference of 120' in elevation from the low to the high point of the campus. The low is in the northeast section along Stoney Creek at approximately 210' in elevation and the high is in the southwest section in the open area adjacent to the intersection of Rockville Pike and Jones Bridge Road at approximately 330' in elevation. The topography varies from rolling hills to significantly steep terrain.

There are forested areas and landscape buffer zones throughout the campus. These are both constraints and opportunities in that they provide pleasant natural areas on campus that are worth preserving. In some cases, such as the north boundary and a portion along Jones Bridge Road, they provide a desirable buffer between adjoining residential land uses.

A significant natural feature is Stoney Creek and its 100-year flood plain, which bisects the campus from the southwest to the northeast. The erosion of this creek over the years has provided pleasing variations of land form, but some steep slopes have resulted that certainly limit the construction opportunities. At the same time, this provides a natural focus that should be maintained for recreation, walking paths and opportunities to highlight nature.

These natural areas can enhance the healing environment of the campus and support evidence-based design. In turn, this environment provides for a rich context for the integration of healthcare designs that create environments that are therapeutic, supportive of family involvement and restorative for workers under stress.